AMENDMENT TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Currently Amended) A PCR (polymerase chain reaction) device comprising:

an inlet through which a biochemical fluid is injected;

an outlet through which the biochemical fluid is discharged;

a PCR channel positioned between the inlet and the outlet;

a heat source for operating the PCR device; and

first and second micro-valves which is formed as channel for containing a sol-gel transformable material, wherein the first and second micro-valves control opening and closing of the inlet and the outlet, and intersect portions of the PCR channel near the inlet and the outlet of the PCR device, respectively;

wherein the PCR channel extends in a first direction on a plane and the first and second micro-valves extend in a second direction on the plane of the PCR channel, the first direction and the second direction being perpendicular to each other,

wherein the sol-gel transformable material transforms from a sol state into a gel state at a temperature lower than DNA denaturation temperature, annealing temperature and extension temperature and higher than room temperature, as the temperature increases to operate the PCR by the heat source; and is operative to control the opening and closing of the first and second micro-valves; wherein an additional heat source for controlling the temperature of the sol-gel transformable material is absent from the PCR device; and wherein an additional valve means for the inlet and the outlet other than the first and second micro-valves is absent.

2. (Previously Presented) The PCR device of claim 1, wherein the sol-gel transformable material is a methyl cellulose solution.

3. (Withdrawn) The PCR device of claim 1, wherein the first and second micro-valves form the inlet and outlet of the PCR device, respectively.

4. (Withdrawn) The PCR device of claim 1, wherein the first micro-valve extends in a direction in which the biochemical fluid is injected into the inlet, and the second micro-valve extends in a direction in which the biochemical fluid is discharged through the outlet.

5. (Withdrawn) The PCR device of claim 1, wherein the first and second micro-valves are interconnected with the inlet and the outlet, respectively, the first micro-valve branches off from a portion of the PCR channel near the inlet in a different direction from a direction in which the biochemical fluid is injected, and the second micro-valve branches off from a portion of the PCR channel near the outlet in a different direction from a direction in which the biochemical fluid is discharged.

6. (Cancelled)

7. (Withdrawn) The PCR device of claim 6, wherein one end of the first micro-valve is connected to one end of the second micro-valve.

8. (Withdrawn) The PCR device of claim 1, wherein the first and second micro-valves intersect portions of PCR channels of a plurality of PCR devices near inlets and outlets of the PCR devices, respectively.

9. (Withdrawn) The PCR device of claim 8, wherein one end of the first micro-valve is connected to one end of the second micro-valve.

10. (Withdrawn) A method of regulating opening and closing of an inlet and an outlet of a PCR device, the method comprising:

connecting micro-valves, each of which contains a sol-gel transformable material that transforms from a sol state to a gel state at a temperature lower than DNA denaturation temperature, annealing temperature and extension temperature regarding PCR and higher than room temperature, to the inlet and the outlet of the PCR device; and

inducing a sol-to-gel transformation in the micro-valves using temperature variations in a thermal cycle of PCR.

11. (Withdrawn) The method of claim 10, wherein the sol-gel transformable material is methyl cellulose.

12. (Withdrawn) The PCR device of claim 2, wherein the first and second micro-valves form the inlet and outlet of the PCR device, respectively.

13. (Withdrawn) The PCR device of claim 2, wherein the first micro-valve extends in a direction in which the biochemical fluid is injected into the inlet, and the second micro-valve extends in a direction in which the biochemical fluid is discharged through the outlet.

14. (Withdrawn) The PCR device of claim 2, wherein the first and second micro-valves are interconnected with the inlet and the outlet, respectively, the first micro-valve branches off from a portion of the PCR channel near the inlet in a different direction from a direction in which the biochemical fluid is injected, and the second micro-valve branches off from a portion of the PCR channel near the outlet in a different direction from a direction in which the biochemical fluid is discharged.

15. (Cancelled)

16. (Withdrawn) The PCR device of claim 2, wherein the first and second micro-valves intersect portions of PCR channels of a plurality of PCR devices near inlets and outlets of the PCR devices, respectively.

17. (Previously Presented) The PCR device of claim 1, wherein the sol-gel transformable material transforms from a gel state into a sol state at a temperature lower than DNA denaturation temperature, annealing temperature and extension temperature and higher than room temperature, as the temperature decreases after the PCR is terminated.

18. (Previously Presented) The PCR device of claim 2, wherein the concentration of the methyl cellulose solution is 2w% or less.

19. (Previously Presented) The PCR device of claim 2, wherein the concentration of the methyl cellulose solution is 0.5w% or less.